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VOLUME XXIX NOVEMBER, 1930 NUMBER 8

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Published by A. J. Nystrom & Co., for The National Council of Geography Teachers
George J. Miller, *Editor*

The JOURNAL *of* GEOGRAPHY

A MAGAZINE FOR SCHOOLS

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Dr. James is an associate professor of geography at the University of Michigan, and has contributed many articles to the JOURNAL and to other magazines. At the present time he is engaged in field studies in Brazil.

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Dr. Davis—Dean of American Geographers—is professor of geology emeritus of Harvard University. He now makes his home in Palo Alto, California. Dr. Davis is actively engaged in studying and writing, and during the past summer was at the University of Oregon.

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Dr. Renner is associate professor of geography at the University of Washington, Seattle, and has made frequent contributions to the JOURNAL. Readers interested in geographic education are referred to "Some Principles of Commercial Geography," and to "Contributions of Geography to Vocabulary" which appeared in December, 1926 and October, 1927 respectively.

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Miss Bundy is a teacher in the Central Junior High School, South Bend, Indiana, and in Ball State Teachers College, Muncie, Indiana, during the summer terms 1925-1929. Miss Bundy has contributed the following articles to the JOURNAL. A Project for the Study of Home Geography, December, 1925; A Study of Siberia, April, 1926; With the Spanish Aviators, March, 1927; A Study of South Bend as an Industrial Center, April, 1928.

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VOLUME XXIX NOVEMBER, 1930 NUMBER 8

THE SHARI PLAIN

PRESTON E. JAMES
University of Michigan

Grass! Grass which rises to heights of 12 feet overhead and shuts in the narrow trails; monotonous stretches of grass where nothing can be seen of the country beyond the rank vegetation, with here and there a few low trees all but hidden from view. The prevailing color is brown, a parched dead brown; for this is January, the middle of the dry season, and the vegetable world is at rest. The trees have dropped their leaves. In the scorching heat, tempered by only scattered clouds, everything is withered. Even the rivers have become mere trickles of water. The flood plains stand out as broad sandy flats, glistening white in the sun, marked here and there by stagnant pools covered with green scum, or by reed-filled swamps. Along the river banks are scattered the native villages: small clusters of huts shaped like beehives, and built of grass which blends at this season of the year with the prevailing brown color of the landscape.

In late January or February the natives burn the savannas. The air is filled with the smoke of grass fires. The timid, grazing animals, concentrated near the water holes, run for their lives before the fires, for this short period substituting this new fear for the fear of their natural enemies, the lions and other carnivora. The surface which is revealed by the fires is monotonously level, dotted with scattered low trees, or with trees grouped together to form small thickets. The vegetation gives the landscape an aspect not unlike that of a park or orchard.

Then come the rains—perhaps in March or April. The transformation is remarkable. Tender shoots of succulent green grass appear; the trees are quickly covered with leaves; insects in great numbers come forth; the rivers are filled with torrents of water;

from a death-like sleep the landscape throbs with luxuriant growth, a forced growth hastened by high temperature and humidity.

The Shari Plain comprises the southern half of the Lake Chad depression of north-central Africa. The whole area is a struc-

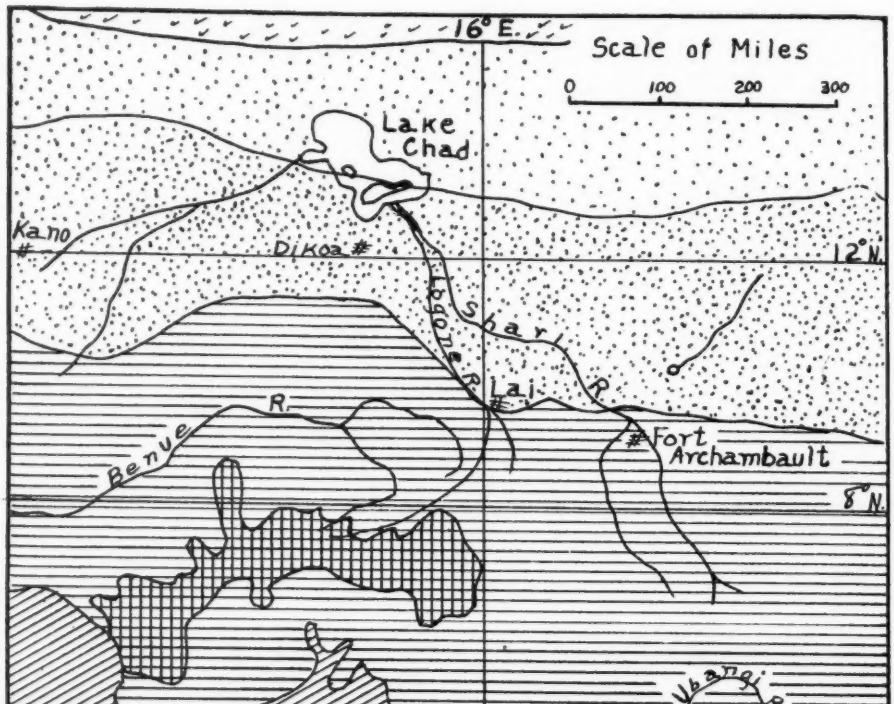

FIG. 1. Map of Shari Plain showing vegetation types. (After H. L. Shantz, and C. F. Marbut: The Vegetation and Soils of Africa. Am. Geog. Soc. Research Series, No. 13, New York, 1923.)

tural basin, monotonously flat, occupied near its center by the vast, shallow, reed-filled body of water known as Lake Chad. North of the lake lies the Sahara with its wadi systems preserving the skeletons of ancient drainage lines now long since dry. To the south are the grasslands and forests of the regions of greater rainfall nearer the equator, and from this direction come the rivers, chiefly the Shari and Logone, which supply the Lake Chad waters. It is

this southern part of the Chad Basin with which we deal in this study, typical as it is of the transitional landscapes which lie between the desert on the one side and the tropical rain forests on the other.

The Shari Plain itself is marked by constantly smaller amounts of rainfall as one proceeds northward; and this climatic transition is reflected in many forms of the landscape. The whole region,[1] however, from about latitude 8°N. as far as Lake Chad, is characterized by a monotonously level surface, by a grass vegetation, and by a similarity of cultural forms.

Natural Handicaps to Habitability

Omitting for the present the isolation of the Shari-Chad Plains there are certain natural handicaps to habitability in its physical make-up which would be effective even in more accessible parts of the world. To be sure, many of these handicaps might be overcome were the difficulty of reaching the area from the outside world not so great. Nevertheless, the handicaps which appear here, are also to a certain extent found in savanna regions in other parts of the world.

Climate. The first handicap lies in the seasonal variation of the rainfall, and in the irregularity of the rains from year to year. Fort Archambault, which may be taken as typical of the whole area, receives an average of 41.7 inches a year;[2] but this falls chiefly in the high sun period from May to September, while December, January, and February are usually completely dry. Thus rainfall conditions similar to those in the tropical rain forests are experienced during one season of the year, and during the other, droughts and clear skies such as are common the year round in the desert. The temperatures being high (averaging 81.0°F for the year), evaporation is high, and the land rapidly becomes parched and brown during the dry season. Thus the year is strongly set off into rainy season and dry season when the aspect of the land, and the activities of its inhabitants undergo marked changes.

All might still be well, were it not for the uncertainty of the rainfall. One writer says that "excessively wet years and excessively dry years seem almost to be the rule rather than 'normal'

[1] G. T. Renner. The Geographic Regions of the Sudan, *Economic Geography*, Vol. 2, 1926, pp. 256-273

[2] A. Knox. The Climate of the Continent of Africa, Cambridge, 1911, pp. 219-220

years.''[3] The rains in the Shari-Chad Plains fall during a season of the year when there is a strong in-draft of warm, moist air from the southwest. Slight variations from year to year in the heating of the continent, then, cause marked variations in the strength of the winds, and consequently in the amount of moisture carried inland. While the causes of this irregular heating are not fully understood, the results of it in the form of excessive rains or droughts have been apparent in the Chad region from the earliest records.

Floods and Droughts. Marked fluctuations in the volume of water carried by the rivers occur seasonally and from year to year. These floods and droughts are emphasized by two facts: the levelness of the surface, which permits a slight rise of water to inundate large areas; and the high evaporation, which rapidly dries out the land when the floods subside and which results in an actual decrease in the volume of the rivers downstream. During the high water period which comes at the end of the rainy season and the beginning of the dry season (October on the Shari, and September on the Logone), the rivers become almost impassable torrents, and the floods at least in the north inundate about half of the whole territory.[4] At this time the rivers carry great quantities of sediment. Then as the floods recede a large number of pools of standing water are left speedily to evaporate in the dry air. Lake Iro, east of Fort Archambault, is a depression in which the flood waters of each rainy season accumulate, and which dries out during the dry season to become a vast barren tract of hard baked clay with the characteristic polygonal cracks several inches wide and several feet deep. North of Fort Archambault the tributaries become entirely dry, and elsewhere all the streams are reduced to mere threads of water or to strings of marshes along the wide rainy season channels. The sands which were being transported are dropped. The channels, especially the mouths of the tributaries, become clogged so that the next flood waters find the passage blocked. The difficulty of establishing anything more than a temporary occupation of such lands is obvious.

[3] G. T. Renner. A Famine Zone in Africa, The Sudan, *Geogr. Rev.*, Vol. 16, 1926, pp. 583-396

[4] Aug. Chevalier. Rapport sur une Mission Scientifique et Economique au Chari-Lac-Tchad, Nouvelles Archives des Miss. Scientifiques et Litteraires, Min. de l'instruction publique et des Beaux-Arts, Vol. 13, 1926, pp. 7-52

Freydenberg; Explorations dans le Bassin du Tchad, *La Geogr.*, Vol. 15, 1907, pp. 161-170

The Vegetation. The next great handicap to the occupation of this region is the character of the vegetation. The tall, rank, growth of grasses only edible for cattle when the young green shoots first appear, and soon reaching, in the high grass savannas, heights of as much as 12 feet, have already been described. During the dry season these grasses turn brown and become parched and brittle. Each year in January or February the natives start fires which burn away this rank growth.[5] At this time of the year only is the character of the surface generally visible, for as soon as the fresh growth gets a start, the trails are again hidden by an impenetrable wall of green and one appreciates the feelings of an ant crawling

FIG. 2. Native village on the northern slope of Congo-Shari watershed in French Equatorial Africa. The huts are thatched with elephant grass. Courtesy, Owen Tweedy and Royal Geographical Society.

thru a well-mowed lawn. The difficulty of clearing such lands for agriculture is very great, greater even than the clearing of the rain forest. While a burning in the forest removes enough of the vegetation so that crops can be raised at least for a time, fire does not destroy grass, which springs up again with renewed vigor as soon as the rains begin. With the primitive instruments of agriculture which these people use, they are powerless against grass. Thus crops are raised chiefly on the bare flood plains of the rivers after the period of inundation is over. In spite of the character of the

[5] W. Busse, Die Periodischen Grasbrände im Tropischen Afrika; ihr Einfluss auf die Vegetation, und ihre Bedeutung für die Landeskultur, Mit. aus den Deutschen Schutzgebieten, Vol. 21, 1908, pp. 113-139

surface, and the fertility of some of the soils, the inhabitable spots are perhaps even more narrowly limited by grass than in the rain forests by trees.

Insect Pests. Standing water and rank vegetation: these are the conditions best suited for the production of an abundant insect life. During the rainy season over the whole country, and thruout the year close by standing bodies of water, mosquitoes and flies form a serious menace to health and comfort. Several species of Glossina, an insect closely related to the famous tsetse fly, are found along the Shari and Logone Rivers especially in the area of high grass-low tree savanna,[6] where they make the maintenance of cattle very difficult. Anopheles mosquitoes, too, abound in both southern and northern districts during the rainy season, so that malaria is common and widespread. In addition there are a number of other disease-carrying insects the distributions of which are more narrowly limited, certain restricted localities coming to have a reputation for unhealthfulness as a result of their presence there. While insects may be largely cleared out, or at least held in check by the application of scientific sanitation, to the primitive peoples of the Shari Plains, or to pioneers from other lands who invade this region, they form a handicap of the greatest importance.

WARS AND CONQUESTS

Such natural handicaps would be difficult to neutralize in any region, and by any group of people. When, in addition, we note that the inhabitants have been involved first in petty tribal warfare and then in the ravages of the slave raiders, and that freedom from the constant danger of attack is a state only recently achieved, the present backward condition of the country becomes all the more understandable.

The Native Inhabitants. A number of tribes of Negro people were the first inhabitants of the Shari Plains. Each tribe differs in many details of language, social customs, and in methods of adjustment to the habitat. For example the house types thruout the region are prevailingly of the beehive form; yet each village exhibits in the details of construction some variation of the traditional model.[7] Owing to the frequency of floods or droughts, either of which is disastrous to the crops, each tribe had developed some

[6] Aug. Chevalier, op. cit.

[7] Adolf Friedrich, Duke of Mecklenburg, From the Congo to the Niger and the Nile. Trans. London, 1913

method of storing food from one year to another. In fact it is reported that they scarcely expected to harvest a satisfactory crop more than every two or three years. The methods of storing grain vary from large earthenware jugs, standing 12 feet or more in height, to underground storage rooms carefully protected from ants. The former method is common in the northern district where the storage jugs form as much a part of a group of farm buildings as does the corn crib of the North American corn belt. However, in a land of constant inter-tribal warfare, such storage devices are peculiarly open to destruction. In times of famine, especially, one tribe having used up its supply of grain, turns, in the fight for life itself, to the raiding of its neighbors. Added to the uncertainty of the harvest, therefore, was the uncertainty as to whether the carefully stored food supply would not be carried off by the sudden raid of a neighbor. In the same way the maintenance of any large herds of cattle was discouraged. There is some question as to which was the more destructive: the insect pests, or the raiding humans. Under such conditions, both natural and social, any possible steps toward a more permanent occupation of the land, the construction of irrigation or drainage works, or any such cooperative effort was out of the question. The successful occupation of lands of difficult habitability can be accomplished only by peoples with strong governments.

The Invaders from the Desert. At one time a black people inhabited all of the Sahara and following the introduction of the camel, these native inhabitants were pushed southward or enslaved for agricultural work in the oases by various Moslem tribes who formerly lived along the Mediterranean margin of the desert.[8] The sweep of this invasion has crossed the desert and entered the grasslands to the south of it.[9] In the Shari Plains the invaders from the desert make up the majority of the inhabitants of the northern district, and in the southern district are extremely numerous as traders, especially in the larger towns.[10] The invaders, armed with the militant religion of Islam, and with a superior military and political organization, found the warring and disunited tribes of Negroes easy game. A large part of the caravan trade across the Sahara

[8] E. F. Gautier. Le Sahara, Paris (1923), p. 100

[9] L. W. G. Malcolm. Islam in the Cameroons, West Africa, *Journ. of the African Soc.*, Vol. 21, 1921-22, pp. 35-46

[10] I. Bowman. The Mohammedan World, *Geog. Rev.*, Vol. 14, 1924, pp. 62-74, map facing p. 72

was made up of slaves. The slave raiders would descend upon a village, burn and destroy its houses and its stores of food, kill such of its inhabitants as could not stand the hardships of the march to the slave markets and carry off especially its young women and boys. Even if 80 per cent of these people died on the way to the markets, a handsome profit could be made on the remainder. The direct result was an additional discouragement to the accumulation of property or the construction of permanent works of any kind. To this day the ruins of villages destroyed by slave raiders, now largely overgrown with grass, are frequently encountered along the trails.

Fig. 3. The Shari River at Fort Archambault. Courtesy, Owen Tweedy and Royal Geographical Society.

The European Conquest. The first European mission to arrive in the region was a French expedition in 1891. Since the beginning of this century, the French garrisons along the Shari, and the garrisons of other European nations whose territories converge at Lake Chad, have put a stop to the trade in slaves, and have maintained something like peace among the inhabitants. Altho nothing has been done by the Europeans to develop the region they control, a number of scientific missions have entered the country[11] and have given us accurate descriptions of the resources, and have suggested the chief lines along which future development may take place.

[11] J. Tilho, The French Mission to Lake Chad, *Geogr. Journ.*, Vol. 36, 1910, pp. 271-288

Projects for Future Development

The European occupation of tropical lands, while frequently justified on the basis of the white man's service to the native, also, in most cases yields an abundant return to the Europeans in the form of essential raw products. Thus a distinction arises between those products which the native peoples raise for their own sustenance, and those products which the native by himself would not raise, but which form, from an economic point of view, the real reason for the occupation by strangers from middle latitudes. In the former class, altho not exclusively, are the usual food crops—vegetables, grains, fruits, and in the latter class such products as cotton or sugar. The export of such products to middle latitude markets, then, is the only method by which extensive improvements in the region can be undertaken. What changes, then, will the European make in the landscape of the Shari Plains?

Overcoming Isolation. Until transportation to the outside world is provided, the European can do little for this region. The inexpensive export of marketable products is the condition to be satisfied before improvements can be paid for. Several railroad projects are considered, some are actually on the way to completion. At present the easiest route to the Shari Plains starts at Lagos on the coast of Nigeria. A railroad runs inland 700 miles to Kano which lies just within the periphery of the Chad Basin. From Kano to Dikoa on the rich plains south of Lake Chad is another 400 miles. This can be covered during the dry season by automobile in about four days, but during the rainy season the roads are impassable.[12] Other possible routes include one across the Sahara by way of the Ahaggar to the Mediterranean, and another southward to the Congo. However, the one thru Nigeria seems the least difficult, and, with the gradual increase in the area devoted to export crops in Nigeria, the present railroad may eventually be extended to tap the Shari country.

Overcoming the Effects of Irregular Rainfall. The irregularity of the rainfall with its resulting floods and droughts makes any organized occupation of the Shari Plains dependent on the construction of irrigation and drainage works. Reservoirs for the storage

[12] P. H. Lamb, Notes on a Visit to Lake Chad. *Geogr. Journ.*, Vol. 58 (1921), p. 443

of water, must be provided. Only when the land is protected from the extensive inundations, and insured against the protracted droughts can any form of intensive agriculture be carried on.

Overcoming Insect Pests. Insect pests are found to a greater or lesser degree in almost all parts of the world. They are especially common in areas of standing water or rank vegetation, and as we have seen, both these conditions are to be found in the Shari Plains. Actual experience has shown, however, that with the expenditure of sufficient money, the insect pests of any area can be so reduced as no longer to form a menace. However, the expenses of such a cleaning up is prohibitive along the frontiers of settlement; in such areas

FIG. 4. The Shari River near Lake Chad showing a native wattle fishing boat. Courtesy, Owen Tweedy and Royal Geographical Society.

settlement has been made in the face of dangerous insects, and only where production reaches sufficient proportions to pay for sanitary measures have these been undertaken. Therefore, in spite of the proven ability of sanitary engineers, in all probability any occupation of the Shari Plains must be made while the mosquito and the tsetse fly are still present. However, if these plains should ever support a dense population with a strong government, the rank growth of grasses would be found in only small sections of the country, and the widespread inundations would be limited to much smaller areas than at present. The insects which today seriously interfere with the health and comfort of the human inhabitants, and

which all but prohibit the maintenance of domestic animals in large numbers, would then be held effectively in check.

Potential Products. All projects for development under the existing economic order must rest on the surplus production of some commodity for which there is a market in the outside world. Many frontiers are developed thru the export of animal products, especially of hides—the most typical of frontier products. But the insects of the Shari Plain, as we have seen, make the raising of animals difficult and hazardous. Turning, then to agriculture, we find that conditions in many places are well suited to cotton and sugar cane. The rich soils of the alluvial bottoms are especially dependable in the northern district just south of Lake Chad where a cotton land of great potential productivity may be found. Cotton of fine quality is now raised there, but owing to the cost of shipment all of the product is consumed locally. With the use of irrigation, these same lands could be used to grow sugar cane, a crop which, only second to plentiful moisture, needs plentiful sunshine. Not only are the low-lying areas rich in soil, but also the higher inter-stream lands; for here, under a grass cover, the mature soil is a rich black in color owing to the high humus content. In the general land classification of Africa by Shantz and Marbut,[13] these lands are rated as potentially high in agricultural productivity, while the alluvial bottoms are rated as potentially very high.

Conclusions

The outlook for the immediate and rapid development of the Shari Plains is not encouraging. Until the frontier of settlement and the railroad lines have pushed farther inland thru Nigeria, these isolated inland areas must remain virtually untouched. They represent those areas of potential production which the world population has not yet called upon for support, but which may later be called into use to care for increasing numbers. In discussing these regions it is important to avoid two extremes. On the one hand we must not accept without investigation the extravagant statements of some travelers who, viewing the exuberance of vegetation, especially its marvelously rapid growth in the early part of the rainy season, have described the land as one of tremendous po-

[13] H. L. Shantz and C. F. Marbut. Vegetation and Soils of Africa. Am. Geog. Soc., New York, 1923.

tential productivity. Just because wild vegetation grows with great rapidity and in great abundance, is no reason to predict that useful crops will grow in a similar way. Nor are the savanna grasslands of the tropics suitable without much improvement for the support of a cattle industry. Then, on the other hand, we must not believe because the combination of uncertain rainfall, grass, insect pests, together with almost continuous petty warfare among the human inhabitants has so far left the area but little developed, that little development is possible in the future. Certainly it is true, however, that the natural obstacles to habitability cannot be overcome by any human group without the strongest of cooperation, and unless the rewards are guaranteed by reasonably stable economic conditions.

THE EARTH AS A GLOBE

W. M. DAVIS
Professor Emeritus of Geology, Harvard University

The pupils of schools in large cities are familiar enough with the change from days of sunlight to nights of electric light, but as their lives are largely spent indoors under a roof or in narrow streets hemmed in by close-set houses, they are unfamiliar with the path of the sun across the day-time sky and they know little or nothing of the stars and their movements across the night-time sky. The pupils of country schools, and especially of country boarding schools, have a much better opportunity of becoming observationally familiar with the great natural phenomena of the heavens, but their opportunity is not as a rule sufficiently cultivated. They may profit by working thru the following exercises, many of which I have recently tested during a three weeks' visit at a boys' boarding school in California. The success then reached makes me wish that the exercises might be systematically tested thru a whole school year: hence I submit them now to progressive teachers for their trial.

The main object of the exercises is rather to cultivate intelligence than to impart information. For this reason they are designed to lead pupils to discover, by their own observation and reflection, various facts which are ordinarily learned from books

and which are thereby stripped of most of their reality; also to cultivate the pupils' ingenuity in devising, constructing and improving the simple apparatus needed for their observations. In order that these objects should be secured it is important that the teacher should not hurry the work along too fast; indeed, one of the chief duties of the teacher is to avoid solving problems and telling answers which the pupils ought to work out for themselves.

It is to be expected that pupils will vary greatly in their liking and their capacity for observational and thoughtful study of this kind. It is therefore advisable, especially when the work is first tried, not to insist upon its completion by those who show no aptitude for it. On the other hand, those who show a liking for it should be encouraged to continue it thru more than one year; for the revision, improvement and extension of a first year's work in a second year will be found extremely educative. A class may be divided into squads of four or five, each squad working under a captain in competition with other squads. A great addition to the value of the exercises may be made by calling for written reports of progress, including description of apparatus, record of observations, and discussion of results. Records of successive classes should be kept on file, so that pupils of later years may, when desired, refer back to the results gained in earlier years.

1. **The Path of the Sun Across the Sky.** Select an open and level space where the greater part of the sky may be seen. The line in which the sky seems to meet the ground is the sky-line. If the country is, like our prairies and plains, level or of low relief, the sky-line is essentially the horizon line. In the center of the selected space, drive a stout center-peg firmly into a hollow in the ground, so that its top shall be at ground-level, as in Fig. 1. Attach to the peg-top a tapering sun-pointer, one or two feet long, so it may turn in any direction. The attachment may be made by two close-fitting hooks, or by a string passed thru holes bored obliquely into the pointed ends of peg and pointer and coming out at their sides. Slip a disc of paper, an inch or two in diameter, on the pointer near its butt end. Observe the direction of the sun

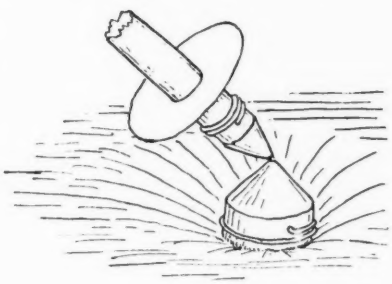

FIG. 1

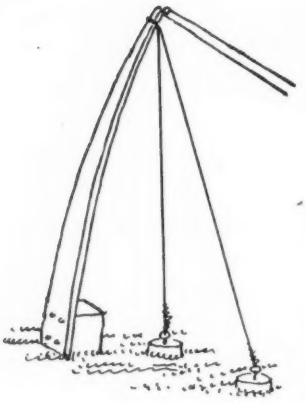

FIG. 2

at an early morning hour, by turning the pointer until it casts no shadow on the paper disc. In order to do this delicately, attach a wire holder near the slim end of the pointer, and thus avoid finger-shadows on the disc. Record the position of the pointer by driving a stake into the ground, so that the stake-top shall touch the pointer-tip. Better than a single long stake is a short stake to the side of which a slender strip is nailed; the stake can be hammered firmly into the ground, so that the strip top is near the pointer tip; and the strip can then be bent and secured in proper position by two wire guys fastened to screw-eyes in near-by short-stakes, as in Fig. 2. Repeat this observation and record six or eight times the first day of work.

Imagine a curved line passing thru all the stake tops; or bend a wire so that it will rest on all the stake tops, Fig. 3. The curve thus defined will be the arc of a circle, parallel to the apparent path of the sun in the sky. It may be called the sun-circle. Stand off some fifty feet to one side, so that it is foreshortened into a straight line. With the eye low down note the points where the sun-circle seems to enter the ground, and guide a second observer to drive in two wooden pins to mark those points. Stretch a string connecting the two pins. Stretch a second string from the center-peg so it shall cross the first string at right angles, and pin it down.

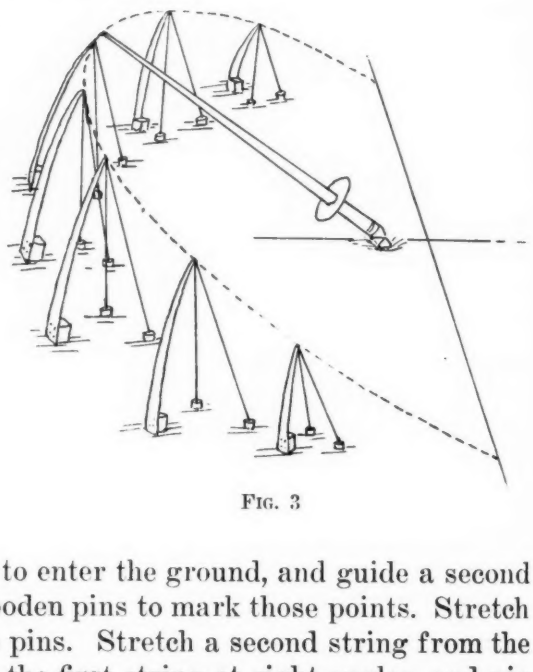

FIG. 3

2. **The Meridian Plane.** Imagine a vertical plane rising from the second string. It will cut the sky into morning and afternoon

halves. The sun passes from the morning half thru the vertical plane into the afternoon half at midday. The vertical plane is therefore called the mid-day or meridian plane. What familiar names may be given to the four points in the sky-line where the strings, prolonged, would reach it? Draw lines from the center-peg to the pins that mark the ends of the sun-circle arc. How are these lines related to sunrise and sunset? How do they stand with respect to the east-west string?

3. **The Sun-Circle Axis.** Hold the sun-pointer square to the plane of the sun-circle. The sun-circle may then be imagined to turn around on the pointer, as a wheel turns around on its axis. Support the pointer in the position of the sun-circle axis in a properly placed two-stick crotch. Fasten a slight stick to the pointer axis six or eight inches from its butt end by a wire nail so that the stick may be turned to make any desired angle with the pointer axis. Call this stick the director. Slip a small paper disc on it. Turn the director so that it points to the sun. Then test the accuracy of the pointer's coincidence with the sun-circle axis by turning it (while it rests in the crotch) and seeing if the end of the director touches all the stake tops. Adjust the pointer and its two-stick crotch to bring about this result. After this adjustment the pointer may be called the sun-circle axis.

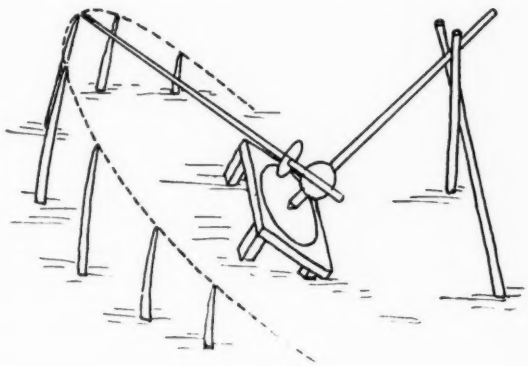

FIG. 4

4. **The Base-Board and the Director Circles.** Set up a shorter two-stick crotch nearer the center-peg, so that the pointer axis, lying in the two crotches, still coincides with the sun-circle axis. Detach the sun-circle axis from the center-peg. Set a slanting base-board over the center-peg so that it shall stand square with the axis, and secure the board by firm supports in this position, as in Fig. 4. Let the sharp basal end of the sun-circle axis (the axis still resting in its two crotches) enter a small pivot-hole in the center of the base-board.

Paste a graduated circle, about 10 inches in diameter, on the

base-board, with its center at the pivot hole. This is the base circle. Attach an index hand close to the base of the sun-circle-axis in such a position that when the director is turned square to the axis, the director and the index shall be parallel. Attach a small graduated circle to the sun-circle axis with its center at the wire nail by which the director is fastened on. This is the director circle.

5. **Sun-Position Records.** The instrument thus constructed may be used to record the position of the sun at any hour of the day. To do so, turn the director toward the sun, and note first the angle to which the index hand then points on the base circle; second, the angle on the director circle to which the director is turned. How had the zero points on these circles best be set? Turn the director so that it shall point to the mid-day position of the sun; to the sun two hours before mid-day; three hours after mid-day; seven hours before mid-day; ten hours after mid-day; at mid-night. How can the director be used to indicate the position of the sun at any hour at night? The base circle may now be called the hour circle. Into how many hours should it be divided? How many hours after mid-day does the sun set? How many hours after mid-night does the sun rise? What is the relation of the after mid-day hour of sunset to the length of the day? of the after mid-night hour of sunrise to the length of the night?

6. **Changes of the Sun-Circle.** About a fortnight after the first day's record of a sun-circle path by stake tops, make a second record of the same kind. How does the sun-circle thus found differ from the first sun-circle? Can this difference be expressed in terms of a director-circle angle?

7. **A Solar Day.** Note the hour when a morning position of the sun is recorded. Along what course does the sun move from that position? The following morning, note the hour when the sun is again in the same position. By what course did it approach this position? Describe the path that the sun followed between the two observations. The time interval between the two observations is a solar day. How long is it?

Measure the hour-circle angle between successive positions of the sun at several different hours of the day and record the times of the observations. Are the time intervals proportional to the angles? Does the sun move along its circle across the sky as uniformly as the hour hand turns on a watch? Does it move at the same angular rate as the hour hand?

8. **Improving the Instrument.** Replace the sun-circle axis (the original sun-pointer) with a longer and stronger rod, such as a broom stick, firmly supported on two crotches. The higher crotch may be strengthened by adding a third stick, making it a tripod. Let a center-pivot at the lower end of the rod rest in the pivot hole of the base board. Provide the rod with an index-hand to measure angles on the hour-circle. Attach a temporary director near the base of the rod to test the accuracy of the rod setting, by seeing if this director touches all the stake tops of a good sun-circle stake record when the rod is rotated. Adjust the rod crotches until the director touches the tops of all the stakes.

9. **The Poles and the Equator of the Sky.** Look at the sky at night and see if any star is close to the point to which the rod points. If so, it may be called the North star or Pole star. Draw a map of that part of the sky, showing the chief stars there seen. Give the stars any names desired. Imagine the rod prolonged obliquely downward thru the earth. What name may be given to the point where it would pierce the sky? Imagine a line around the sky, half way between the two poles. Note any bright stars near this line. What name may be given to it? to the two parts of a sky separated by it? Find two fairly bright stars in the northern sky, a line thru which will lead to the North star. Call the two stars the Pointers. Include them and their neighbors in the star map. Look on the opposite side of the North star, about as far away as the Pointers; note another star group there found. Add it to the star map. These star groups aid in finding the North star.

10. **Polar Distance of a Star.** Attach a light square board, S, Fig. 5, to the rod, RR, near its upper end. Attach a flat sighting stick or director, D, to the center of the square board by a screw near one end so the director may be turned at any angle with the rod. The screw should be in line with the upper edge of the director. Paste to the square board a director semicircle, with its center at the screw center. How should this semicircle be set and graduated, so as to measure the angle between the rod and the director?

Prepare a small pasteboard tube, for use as a sighting tube, by setting square cross-threads at the far end and a paper cap with a small center-hole at the near end. Fasten the sighting tube, T, to the director, D, Fig. 5, so that the axis of the tube shall be parallel to the director-edge. The tube may be used to observe the direction of a star by looking thru the cap-hole and bringing the

cross threads (illuminated by an electric torch held near by) on the star. The tube may then be called an astroscope. How can the angular distance of a star from the sky pole be measured? from the sky equator?

11. **Star-Circles and Sidereal Day.** Record the position, by the two circles, of the brightest star to be seen in the eastern evening sky. Note the time of the observation. Repeat this observation at several successive half hours. Compare the path of the star with a sun-circle path. Repeat the same record several evenings later. In how many hours and minutes does the star make a single circuit of the sky? This period is known as a sidereal day. Compare it with a solar day. If any difference is found, bear it in mind for future explanation. The path of a star around the sky may be called a star circle. Compare several star circles, some of them near the sky equator, some near the sky pole. How do the circles differ? Do any stars remain above the horizon all round their daily circuit? which of the stars in the map of the north polar sky do not set during their daily circuit? How are all the star circles and sun circles related to one another?

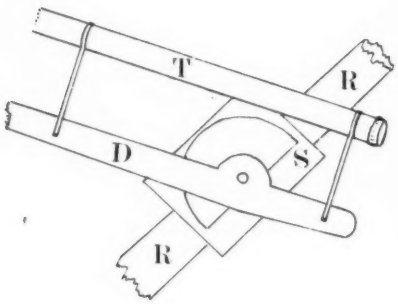

Fig. 5

12. **Rotation of the Earth.** The apparent movement of the sun and the stars around the sky from east to west every day may be explained by supposing that they stand still while the earth turns around or rotates on an axis, parallel to the sky axis, once a day from west to east. The earth does not seem to us to rotate; it seems to stand still. Why are we compelled to believe that it really rotates?

13. **Shape of the Earth.** If we are convinced that the earth is a rotating body, inquiry may be made as to its shape and size. An observer on an extensive plain may use the floating cumulus clouds of fair weather to prove that the plain is a convex surface, not a plane surface. These clouds are formed by condensation of water vapor in rising air currents; they have round tops but relatively flat bases; and in a given flock of cumuli all the bases are at practically the same altitude. The farther away the cloud is, the nearer

its base seems to be to the horizon. Some such clouds may be so distant that only their tops are seen above the horizon; their bases are below the horizon, out of sight. These clouds are "base down," just as distant ships are "hull down" at sea. Hence the plain under the clouds must have a convex surface. If all plains and all parts of the ocean are thus found to be convex, what must be the shape of the earth? What is meant by "up" and "down" with reference to the earth?

14. **Altitude of the Sky Pole.** Measure the angle of inclination of the rod, which is parallel to the sky-axis, above the northern horizon. This gives the angular altitude of the sky pole. Suppose similar instruments were set up and similar measures of polar altitudes were made at other schools in various parts of the world. Would the polar altitude be everywhere the same? How would the various polar altitudes be related to one another if the earth were a ball or sphere? if it were egg-shaped (longer polar than equatorial diameter)? turnip-shaped (longer equatorial than polar diameter)?

Imagine several sun-circle instruments set up in different parts of the United States, and let the angular altitude of the sky-pole be determined at each one. It would be found that the angle is less in the southern states than in the northern states. This cannot be explained by supposing that the rod-axes have different directions at the different places, because they are all parallel to the sky axis and hence must all be parallel to one another. Hence not the axes but the various horizon planes, from which the different polar altitudes are measured, must have different attitudes; hence the earth's surface cannot be flat.

Suppose that two sun-circle instruments were set up on the same north-south or meridian line, as at D and S, Fig. 6. Let DP and SR represent their sky axes. The angular altitude of the D axis is HDP, as measured up from the horizon, HD. The angular altitude of the S axis is TSR. If the greater angle is at the northern station, D, a meridian line, QSDN, lying on the earth's surface, must be convex.

15. **Size of the Earth.** Imagine lines, DO, SO, Fig. 6, drawn from each of the two observing stations to the center of the earth, O. The angle, DOS, will then be the earth-center angle in the meridian plane between the two stations. How can this angle be determined from the two measured angles, HDP and TSR?

Suppose that observers were stationed at two schools about north and south of each other, as at Bismarck, N.D., and Dallas, Tex. Let them exchange records of polar altitude by mail, and then proceed as follows: Measure the meridian distance on a map of the United States between the two places (or between their parallels of latitude if the places are not on the same meridian). Then if the earth is a globe and all its meridians are circles, how can the circumference of the entire meridian, of which DS is part, be calculated? What is the resulting measure of the earth's circumference? What must its diameter be?

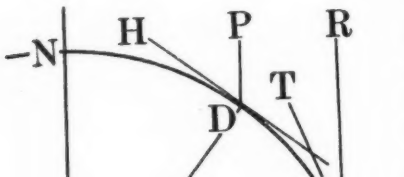

FIG. 6

16. **The Earth Not Exactly a Sphere.** Measurements of this kind have been made with great accuracy in many parts of the earth. They prove that all meridian lines are convex, and that they all converge toward the pole of the hemisphere in which they are measured. They are like the converging ribs of an opened umbrella. The length of a meridian arc corresponding to a difference of polar altitude of one degree has thus been found to be everywhere about (but not exactly) 69 miles. These arcs are found to be longer in high latitudes near the poles than in low latitudes near the equator. Hence the meridians are nearly but not exactly circular; and the earth must be nearly, but not exactly a sphere. Is it egg-shaped (prolate) or turnip-shaped (oblate)?

17. **Polar Altitudes and Latitudes.** What would be the angular altitude of the north pole of the sky as observed at the north pole of the earth? How would the sun-circle or star circles, as there seen, be related to the horizon circle? How could an observer tell when he had reached the north pole?

What would be the angular altitude of the north pole of the sky as observed from the earth's equator? How would the sun-circle and the star-circles as there seen be related to the horizon circle? If an observer were between the equator and either pole, how could he determine the position with respect to them by means of the angular altitude of the sky pole? by means of the slant of

the sun-circle or the star-circles? How could he tell whether he was in the northern or the southern hemisphere?

18. **Longitude.** All observers on the same meridian must have their mid-day at the same moment. Observers on another meridian, farther east, will have their mid-day earlier; those farther west will have it later. Suppose observers in two schools, one at Harrisburg, Pa., the other at Denver, Colo., should determine their time of mid-day, and then compare the times of its occurrence by telegraph or telephone or radio. How could the difference of mid-day times thus discovered be used to determine the angle between their meridian planes where they intersect along the earth's axis? It is by means of observations thus made that the relative longitudes of many points on the earth's surface have been determined.

19. **Northing and Southing of the Sun.** Let the position of the sun with respect to the sky equator be measured every fortnight, or oftener if desired. How does it change? Determine also the altitude of the meridian passage of the sun over the local horizon. How do the directions of sunrise and sunset, and the duration of night and of day-time also vary? When does the sun reach its southernmost position in the sky? When, its northernmost position? On what dates does it cross the sky equator? How do the directions and times of sunrise and sunset, the length of night and of day-time, the angular altitude of the sun over the horizon, and the seasons of the year change with these changes? Explain all this.

Draw three horizontal lines two inches apart on a sheet of paper and cross them with 13 equi-spaced vertical lines an inch apart. Mark the vertical lines with the initials of the months. Assume convenient scales on the vertical lines and represent by dots placed with respect to dates on the first horizontal line the north or south positions of the sun in successive months. Draw a smooth curve thru these dots. Represent with respect to the second horizontal line the northing and southing of sunrise and sunset; with respect to the third, the changing length of the day. Write a general statement descriptive of these correlated changes.

20. **Latitude by the Sun.** How is the slant of a sun-circle plane or of the sky equator related to the altitude of the sky pole? How can the slant of the sky equator be determined from a meridian altitude of the sun by using the sun-path curve of the preceding exercise? How can the observer's latitude be determined by a noon altitude of the sun? This method is used at sea.

21. **Movement of the Anti-Sun.** Set the sighting stick or astroscope toward the sun by means of the two circles at an early evening hour after sunset, when the brighter stars have become visible. Look in the opposite direction and determine the anti-sun point in the sky. Make a map of the stars seen near that point, and locate the anti-sun point among them. Repeat this observation once a fortnight or month. What change is thus found in the position of the anti-sun point among the stars? At what rate does this change take place? What important inference may be based on the observed change of position? Does the slant of the sun-circle change during these observations? How long a time-period is required for the anti-sun point to return to its first noted position? What has the earth done during this time-period? Connect this time-period with that during which the changes in the northing and southing of the sun, Ex. 19, ran their course. What is the name ordinarily given to this time-period? How can the accuracy of its determination be increased? Do the facts thus discovered help to explain the difference in the duration of a solar and a sidereal day?

22. **Path of the Earth.** Place a black-paper cap with a large pinhole in it over the far end of the astroscope. Turn the astroscope toward the sun and measure the size of the sun-light spot on the paper cap at the eye-end of the tube. If the spot is too small to measure easily, make the same observation with a longer tube. Do this as often as the position of the anti-sun point is determined. How can these observations be used to determine whether the distance from the earth to the sun varies during the above-measured time-period? What must be the shape of the earth's path with respect to the sun?

23. **Equatorial Star Map.** Determine the hour-angle between the sky meridians of several bright stars near the sky equator. Measure the angular distances of these stars north or south of the sky equator. (Astronomers call the angle of a star from the sky equator its declination, north or south.) Give the stars names (or learn from a star atlas the names already given them). Select one of these star meridians for a prime meridian (or follow the practice of astronomers and let the northward crossing of the sun over the sky equator mark the prime meridian). Prepare an equatorial sky-chart as follows: Draw a straight line on a sheet of paper to represent the opened-out sky equator. At one end of

it draw another line at right angles and mark it 0, to represent the prime meridian. Draw other meridians for every 30°. Lay off 10° spaces on the meridians on the same scale as on the equator. Enter on this chart the positions of the bright stars, determined as above, with their names. Locate the sun with date on this sky chart for every fortnight. How does the sun's path among the stars stand with respect to the sky equator. Does the path vary from year to year?

24. **The Moon.** Locate the moon by the two circles with respect to the sky equator and the prime meridian. Enter it, with date and hour, on the star chart. Repeat this observation and record every day for several weeks. Draw the illuminated shape of the moon for each observation and enter it near the moon-dot on the chart. How does the shape of the moon vary with its change of position with respect to the sun? How many days are required for the moon to return to the same place among the stars that it had when first observed? How many days to regain the same illuminated shape or "phase" that it had when first observed? This period of time is called a lunation. What changes of phase has it shown during this period? How is the actual shape of the moon indicated by its changing phases? How can the relative distances of moon and sun be (roughly) inferred from the moon's crescent phases?

25. **Distance of Moon from Earth.** In 1750 Lacaille, a French astronomer, went to the Cape of Good Hope. He observed the moon there on a certain night, and later learned that it appeared to be about twice its own diameter farther north with respect to near-by stars than observers at Paris found it to be on the same night. How can the distance from the earth to the moon be worked out from these observations? If pupils in schools at Montreal, Canada, and at Valparaiso, Chile, observed the path of the moon during a lunation and exchanged their records, how could they calculate the distance from the earth to the moon? If the moon happened to pass near a bright star during that lunation, how would that increase the accuracy of observation?

26. **Eclipses.** What is the phase of the moon when an eclipse of the moon occurs? When an eclipse of the sun occurs? Explain these eclipses.

27. **Distance of Moon and Sun from Earth.** Imagine a triangle, the corners of which are marked by the sun, the earth and the moon. At the time of half moon, when the line separating the il-

luminated half from the dark half is straight, what is the angle in this triangle at the moon? Determine the earth-angle by pointing two sticks, pivoted at one end, one to the sun, the other to the moon, and measuring the angle between them. Knowing the moon angle and the earth angle, determine the sun angle. Which must be nearer to the earth, the sun or the moon? Using the distance of the moon as above determined, how far away is the sun? Measure the apparent angular diameter of the sun and of the moon. In view of their relative distances, which one is the larger body? Using the above-determined distances of sun and moon, what are their diameters?

Let it be repeated that the work above outlined must not be hurried. The teacher must not infringe upon the pupils' rights of discovery by prematurely informing them of the answers to their problems. Give them time to make their own discoveries. When questions are asked by pupils in anticipation of future discoveries, say: "Let us wait and see if we can learn that!"

Make it clear that observations of visible phenomena must be extended to invisible phenomena by reasonable inferences. "Go and see" is a good motto; "see and think" is better. Thus intelligence is developed. The problem about the anti-sun point will require over a year for its completion. He will be a dull pupil who can carry this problem thru and not feel a greatly enlivened interest near its end. Of course it is easy enough to look in a textbook and learn that the length of a year is 365¼ days; but that ready-made item of information is of small value to a bright pupil, compared to his own discovery on the basis of his own observations that the earth actually does go around the sun in about 360 days. A discovery of that sort is, in itself, highly educative. Hence, take care that the pupils shall have opportunity of making such discoveries. Evidently, as records for successive years are accumulated, it will be possible to make better and better determinations of the length of a year; for then the total number of days from a first observation of an anti-sun point to the fifth or tenth return of the point to the same position in the sky may be divided by the number of returns. An average value thus determined will probably be nearer the truth than any single determination.

One matter is yet to be emphasized. The teacher must have a

perfectly clear understanding of the exercises before leading a class into them. Then he must patiently persist in holding each phase of the work before the class in order that time for the correction of mistakes, improvement of devices and eventually for the solution of each problem, step by step, shall be allowed. He must be inventive enough to stimulate the pupils by appropriate suggestions if the work lags. He should possess a reserve of interesting items with which the assigned problems here briefly outlined may be brightened up. He should hedge in wanderers who stray off to unrelated questions. He may give helpful hints when progress is unduly slow, and his aid in the careful wording of results may be especially needed. When the pupils ask: "Is this the right answer?" he should know how to say "Don't ask me, ask the facts" without making the pupils feel that they are snubbed. He must feel free and competent to modify the exercises in any way that seems to him desirable; yet he should see to it that the various mental faculties which the performance of the exercises calls into play are given good opportunity for training and growth. These faculties include careful observation of visible facts, ingenuity in the construction of instrumental devices for making observation quantitative, accuracy in the phrasing of descriptive as well as of numerical records, fairmindedness in the induction of generalizations, eager inquiry as to the fuller meaning of discovered facts, fertility in the invention of explanatory hypotheses, logical reasonableness in deducing their consequences, impartiality in confronting the consequences with appropriate facts, honest judgment in estimating the success of the confrontation, and patience in revising work for its improvement. Not that explicit mention of these various faculties should be made! It would be folly to lead school pupils to say: "Behold me, I am now inducing a generalization based on an accumulation of similar facts" or "I am now logically deducing the consequences of an hypothesis which I lately invented." As well expect a child to name the muscles he uses when he is learning to walk; but all the same, just as a normal child learns to reach a desired goal by unconsciously using his muscles when he tries to walk and keeping on trying till he succeeds, so a normal pupil should learn to think out the answer to a good problem by unconsciously using various mental faculties as he tries to think it out, and by keeping on trying until he has thought it out. I am persuaded that he will, if fair opportunity be given, not only think

out these problems, but that he will naturally develop and logically use the appropriate mental faculties that the thinking out demands.

There are few subjects upon which different kinds of thinking can be better practiced than on "the earth as a globe." Evidently, therefore, the chief responsibility of the teacher in work of this kind is to be himself perfectly easy-minded about it, so that he may lead his pupils toward an equally easy-minded attitude. Only then will such a study come to be regarded as an opportunity which a school enables its pupils to enjoy instead of as a task which it compels them to perform.

THE GEOGRAPHY CURRICULUM

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No subject in the modern school curriculum has passed thru as interesting an evolution as has geography. Geography, the "Mother of Sciences," has given birth to half a score of daughter sciences which possess clear-cut fields of subject matter, but its own field has been but illy defined. This is perhaps the result of the delightfully vague name, "geographia," which Eratosthenes of Alexandria (276-194 B.C.) bestowed upon it.

Problems Confronting Geography

Geography is today one of the most vigorous subjects in the American public school curriculum. It has achieved this position only after a slow and prolonged struggle, during which the content and aims of the subject have changed almost beyond recognition. Depending upon the interests and aims of its proponents, geography has at times been astronomical, mathematical, cartographical, navigational, explorational, geological, anthropological, encyclopedic or merely descriptive. Even in the relatively short period covered by the history of the American school system, geography has possessed a variety of aims and assumed many different forms.[1]

It is evident from a perusal of the history of the subject, that geography has undergone a continuous line of development, reflect-

[1] C. R. Dryer, A Century of Geographical Education in the United States. *Ann. of the Assoc. of Amer. Geog.* Vol. 14. Nashville, 1925

ing at every stage the social needs and viewpoint of the times.

Today geography shows an interesting and extremely useful tendency toward evolving into a study of human ecology. Such an evolutionary tendency is the result of the desires of no person or persons, but of the pressing need for the interpretation of our complex modern life, in terms of environmental considerations involved.[2]

Geography's continued state of flux, has been, in one sense, a tremendous advantage, for it has permitted that science to evolve into a subject of very great social usefulness, rather than allowing it to crystallize into a mere formal discipline long before its social values had fully emerged. On the other hand, such a continued state of flux did result in several severe handicaps to geography. The more important of these handicaps are (a) a lack of prestige in the estimation of school administrators and the general public; (b) a dearth of trained teachers who possessed more than a mechanical or rote knowledge of geography and who regarded geography as their most important line of work; (c) a scarcity of good textbooks, and (d) the possession of a very miscellaneous and poorly organized curriculum in geography.

A Miscellaneous Geography Curriculum

No subject thus handicapped can successfully maintain a place in the modern school program. Happily, the first three of the above-mentioned shortcomings of geography have either been solved or give promise of solution. But the fourth, that of an unorganized and miscellaneous curriculum, constitutes a critical problem, the more so because it is not generally recognized to be a problem. Out of the very nature of things the recognition of a problem must constitute the first step toward its solution. Upon the recognition and solution of this problem hinges the future success of geography in the public schools of the United States.

The long-felt need for good geography books is now being met by an ever-swelling flood of textbooks, geographical readers, travel books, source books, study outlines, project plans, manuals, etc., and the end is not yet. Any survey of a random selection of schools will show that a motley array of textbooks is in use, some one-cycle, some two-cycle and a few even involving a three-cycle plan. Built upon various selections from this welter of new material, ex-

[2] Clarence Jones, Trends in Modern Geography, *Science*, Sept. 12, 1924, pp. 374-6

tremely dissimilar courses of study are achieving very divergent ends thru widely different means.

Practically every teacher of geography in state universities and normal schools is called upon, at one time or another, to aid or advise the public schools in their selection of textbooks or the planning of a course of study. The writer, after examining more than one hundred recent publications in geography, was completely at a loss as to which to recommend to school authorities who frequently came seeking help and advice. Clearly there is needed a sound plan for a uniform geography curriculum to guide the school in its choice of texts and subject matter. The purpose of this paper is to call attention to this need and, secondly, to present a tentative plan for such a curriculum.

BASIC CONSIDERATIONS

Any successful curricular program for geography must accomplish the following: (a) It must include all, and not merely part, of the phases and aspects of geography; (b) it must be allotted sufficient time in the school program and be present in the school curriculum over a long enough span of years to accomplish its educational function; and (c) the subject matter of geography must be arranged in such a manner as to involve a developmental sequence.

Geography has, unlike some subjects, many phases and subdivisions, an expectable situation in a subject whose field is as broad, whose aims as manifold, and whose heritages as diverse as geography. Some four phases of geography are necessary to the well rounded curriculum: (a) Basic preliminary studies which set the viewpoint, provide the elements to be used and awaken an interest in the subject. (b) Regional continent study which familiarizes the student, in an elementary way, with the entire world, and which deductively and inductively trains the student in interpreting the relations between human life and the regional aspects of the natural environment. (c) Systematic studies of the major subdivisions of geography. (d) Provision for the specific tools and skills necessary for geographic work.

Adequate provision for all of these four phases of the subject requires the presence of geography in every year of the entire public school period above the primary years. Probably no other subject can make a similar claim. The subjects of the primary and

elementary school curricula fall into two classes, the tool subjects and the content subjects. The former group includes reading, writing, arithmetic, spelling, drawing and grammar; the latter group includes literature, history and geography. Thus, geography shares with two others the importance of providing the entire content of the school curriculum. In addition, geography enjoys the unique position of being the only practicable core subject for curricular unification. Furthermore, geography is the only subject which undertakes to provide the student with the means to interpret present-day human life. Because of these values attaching to geography it has been almost universally accorded a place in the public schools from grade 4 to grade 7. Similarly, since 1918, geography has assumed an increasingly important place in the colleges and universities. But between the upper and lower levels of our school system there is a tremendous hiatus, for geography is practically lacking in the junior and senior high schools. The lack of geography in the high school has resulted in an interesting situation. The preliminary studies have been neglected or condensed so as to be largely futile. The imperative need of finishing the continent studies before high school work has been entered upon, has telescoped that phase of geography to a point where it has become either a fact-cramming contest or a series of disjointed problem studies, depending upon which road out of the difficulty has been taken. Similarly, the systematic studies of the major fields of geography have been squeezed into one or two high school semesters of physical or economic geography, or more frequently, entirely abandoned.

The result of this has been that when the student enters college he is almost totally unfitted for work in history, the social sciences, commerce and other studies which demand a geographic background. In practically all the larger universities, students entering classes in geography must be dealt with as tho they had received no instruction whatsoever in geography. This is necessary because more than nine-tenths of all entering college freshmen will fail in a deductive test in geography designed for the seventh grade, and nearly 85 per cent of them will fail in a test involving merely the location of fifty common place names. Indeed, one may seriously question the value of continuing geography instruction in the public schools unless some far-reaching revision is made.

In the past geography has commonly been regarded as composed largely of informative and descriptive material. Thus, it has been considered advisable to cover the entire earth in a preliminary way and then repeat the process in a slightly different and expanded manner. Often a third review was considered advisable. This process of drill and review is appropriate enough if geography's major contribution to the student's education be one of fact for its own sake. This, however, may be challenged. Rather, the educational function of geography is to accomplish training in the interpretation of the relations existing between man and his natural environment, the promotion of exact thinking by linking causes with results and the stimulation of the application of geographic principles to present-day world affairs.

Under these objectives, two-cycle and three-cycle programs for geography disappear, and a one-cycle program, proceeding from simple material to complex material and involving a steady stream of development in exact thinking in causes and results, takes its place. Indeed, the making of a geography curriculum for any part of the school system must be regarded as merely a part of a single large unit involving the elementary school, the junior and senior high schools and the college or university. Any proposed curriculum for geography must, therefore, (a) include all of the important phases of the subject and (b) introduce them in the most advantageous and fruitful order.

Grade Placement of Subject Matter

The following allotment of geography's subject matter to the various grades is suggested[3]:

Primary School

1st grade .....
2nd grade ..... } Pre-geography work
3rd grade .....

Elementary School

4th grade ..... Home Geography
5th grade ..... Type Studies (Journey Geography)
6th grade ..... Regional Continent Geography

Junior High School

7th grade ..... Regional Continent Geography (cont'd)
8th grade ..... Regional Continent Geography (concl'd)
9th grade ..... Political geography.

[3] The tool aspects of geography such as place location, geo-mathematics, cartographics, etc., should be taught only incidentally and introduced as a need for them arises.

SENIOR HIGH SCHOOL

10th grade .....Physical Geography
11th grade .....Economic Geography
12th grade .....Historical Geography

The advantages of the above plan are that it proceeds from the simple to the complex, each unit of work prepares for the following units, all of the important phases of geography are included and no repetition is involved.

PRE-GEOGRAPHY WORK

Pre-geography work for the primary years is still very largely in the experimental stage. Much can be done by the primary teacher, however, to awaken an interest in geography and to prepare the pupil for his first unit in the subject. Little stories and readings about plants and animals, about forest, field and stream, about little folk in other lands, while in themselves are not geography, nevertheless may prove valuable in enriching the child's background for preliminary work in geography. At all events such work should be largely informal. The amount of pre-geography information obtained in the primary grades depends largely upon the teacher and her opportunities for such work.

HOME GEOGRAPHY

The formal study of geography should begin in the fourth grade. Since the days of Rousseau and Pestalozzi it has generally been recognized that the study of geography should logically begin with the home and the local region. By so doing, the child begins with the tangible actualities of the subject and progresses outward from the known to the unknown. Most of the so-called home geographies now in existence are composites of nature study and elementary facts of economic and civic life. Much can be done toward improving their quality and rendering them really geographic in nature.

TYPE STUDIES

The work in the fifth grade should be devoted to type studies, whose function is that of giving to the child a number of clear-cut geographic concepts for later use in correlation and comparison. The most advantageous plan seems to be that of "journey geography" where the class goes upon an imaginary trip, pausing at intervals to examine selected local geographic studies. By this means the child's interest in geography is stimulated, he is equipped with

a set of pattern studies for use as a preliminary background, but most important of all, the globe and the map of the world is made to grow and take form before his eyes as he rapidly expands his knowledge. At each stage of this work, reference should be made back to the previous unit of home or local geography.

CONTINENT GEOGRAPHY

At the beginning of the sixth grade the child is ready for intensive work in continent geography. North America is, of course, logically the third unit of work. From the home state, study should progress outward until the United States has been covered. Next, our neighbors north and south, should be studied—Canada and Mexico. Correlations with home geography and journey geography should constantly be made. The state geography supplement will be found to be a valuable aid in tliis unit.

During the study of North America, reminders of the European origin of its inhabitants will have constantly appeared. This leads naturally to the fourth unit of work, in the seventh grade. Europe should be studied during the first half year, followed by Asia during the second half year. Constantly increasing difficulty is assured by the passage to increasingly unfamiliar material, by the increasing complexity of the social life of peoples studied and by the increasing possibility of correlation and comparison with what has preceded.

As Europe is studied, the matter of the expansion of European countries arises time and again in one form or another. This prepares for the fifth unit of work which includes the southern continents, South America, Africa and Australasia. These lands can be studied not only for themselves but as cultural or political dependencies of Europe. Caribbean North America may well be studied here in connection with South America and treated from the angle of North American expansion.

GEOGRAPHY OF NATIONS

When the pupil enters the ninth grade (the freshman year of the four-year high school) he will have laid his foundations in home geography, expanded his background in type studies and obtained a complete knowledge of the world in his three years of continent geography. He is then ready (and what is more, soundly equipped) for a new type of work. The sixth unit of work then should be

the geography of nations—a preliminary sort of political geography. A selected list of ten or a dozen nations should constitute the year's program. Each should be studied as an example of a nation's adjustment to its environment and to its world relations with the purpose of developing the idea of national economy. Patriotism can thus be fairly appraised, international thinking and sympathy stimulated and current events discussed.

Physical Geography

The seventh unit of work (for the tenth grade) should consist of physical geography. This is a comparatively difficult subject and should not be introduced early in the curriculum. However, it is absolutely prerequisite for sound work in the year of economic geography which is to follow. This unit of work should establish in the pupil's mind an appreciation of nature, a knowledge of the forces and processes involved in shaping the natural environment, and a preliminary introduction to the methods and viewpoints of science.

Economic Geography

In the eleventh grade, the eighth unit of work should consist of what is usually termed industrial and commercial geography. Its function is to study the major occupations of mankind in their relation to the environment. Such a study provides the basis for economics and furnishes valuable aid to the study of history and the other social sciences.

Historical Geography

The ninth and last unit of work, reserved for the twelfth grade, affords a fitting climax to the public education in geography. Its aim should be to accomplish a three-dimensional analysis of American development. The present status of our national life should be interpreted in the light of the successive geographies of the past. In this way the United States will be viewed not as an historical accident, nor as a self-generated political power, but as the natural resultant of a long line of progressive adjustments to the environment.

Selection of Textbooks

The question of selecting textbooks for such a curriculum at once arises. At first glance this appears difficult, for no author

or combination of authors have produced a series of texts to cover such curricular organization. However, suitable textbooks do now exist and, if impartially selected, can be arranged into a fairly satisfactory series. At the University of Washington, a summer class of 140 geography teachers from nearly a score of states was set at work upon the problem of examining the more representative school texts in geography with a view to making a selection which would most nearly meet the needs for the ideal curriculum in geography.

The resulting selection brought to light several interesting facts: (a) That among the many so-called "home geographies" already published there is apparently only one which is geographical enough in nature to merit its title, or even to warrant use. (b) That there is now on the market a really sound and constructive one-cycle series of geographies suitable for use from grade 5 to 8 inclusive—a series which represents a new departure in textbook writing and not merely a hasty rewrite of an earlier two-cycle text. (c) That for use in the period from grades 9 to 12 inclusive there is practically no satisfactory text dealing with political geography and national economy. One textbook alone exists which is usable. Similarly there is but one satisfactory book on the historical geography of the United States. That in the field of economic geography, good texts are relatively numerous, so that a selection from them constitutes but a small problem. That there are now in print several very excellent textbooks of physical geography, but that among them, one book stands out strikingly as a model of attractiveness and appealing interest.

Conclusions

The actual list of textbooks selected by the aforementioned group is not included in this paper; it would be bound to provoke partisan discussion and thus cloud the main issue, viz., the need for a standard curriculum in geography. The selection of textbooks was merely made to demonstrate that there are already in existence the kind of textbooks to render possible a complete and logically arranged geography program.

Were such a plan as is suggested in this article, for the selection and arrangement of materials and subject matter, formulated and generally endorsed by geography teachers, a standard would be set up for the guidance of the local makers of curricula and courses of study. Moreover, textbooks in the future would speedily

be rewritten in order to become part of a complete curriculum sequence rather than as they now are, isolated and detached units. In addition, units of geography instruction obtained in one school system would be interchangeable with those of any other school system—a condition not even approached at the present time. Lastly, such a complete and developmental program in geography should enable the student to enter the college or university in possession of a training in the subject comparable to that which he possesses in mathematics, history or reading and literature. No longer would it be necessary for the college or university teacher of commerce, geography or the social sciences to assume, *a priori*, that the entering student possesses no geographic training. On the other hand, the student would be prepared to enter upon his work at the true tertiary level.

PEPPERMINT INDUSTRY IN INDIANA-MICHIGAN

ALICE BUNDY

Central Junior High School, South Bend, Indiana

Queer looking buildings attract the attention of the tourists on the public highways in the two northern tiers of counties in Indiana and in southern Michigan. These buildings stand a short distance back from the public road and each have a chimney on the end. They are stills which are the factories for the extraction of oil from peppermint which is one of the most important farm products. This section has been producing from 80 to 90 per cent of the world's supply of peppermint oil. Lands have been found in Texas and Oregon on which peppermint can be grown profitably, but even yet the Indiana-Michigan fields yield at least 65 per cent of the world's production (1927).

Records show that wild peppermint, which was found growing along the streams, was cultivated commercially in New York during the early part of the nineteenth century. From New York its cultivation extended westward into Ohio, and reached the St. Joseph Valley in southern Michigan and northern Indiana about 1835, where it was grown successfully. The industry declined in New York and Ohio, but in the Indiana-Michigan section it became a profitable side line for farmers, and later a major crop. In 1925 about 35,000 acres were planted to peppermint of which about 26,000 acres were in Indiana and 9,000 acres in Michigan. For

the last few years the normal yield of St. Joseph Valley has been about 600,000 pounds of oil which brings about $4,000,000 annually to the farmers of the Valley. The acreage devoted to the growing of the crop varies directly as the fluctuations in the price of oil, which in turn is controlled by the law of supply and demand. In the fall of 1897, mint sold for as little as 75 cents a pound, but during the winter of 1925-26, when there was a short crop in the Indiana-Michigan section, the price reached $35 a pound.

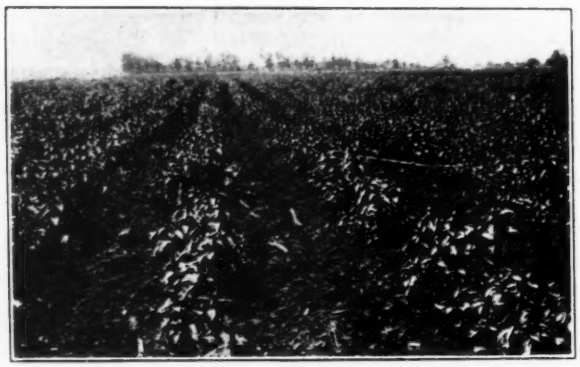

FIG. 1. The first season the mint is planted in rows

The peppermint industry has become important in northern Indiana and southern Michigan because the climatic conditions are favorable and soil conditions are peculiarly suited to its growth. Mint requires a growing season of from 100 to 120 days, that is from the time the plant begins to peep above the ground until it is harvested. The muck land, which was at one time the bottoms of old lakes, and swampy land which formerly was covered with Sphagnum Moss and tamarack are the ideal soil locations for the growing of mint. These areas of rich, deep, damp soil are often large fields, sometimes a thousand acres, in which machinery can be used profitably.

FIG. 2. After the first season the plants spread in all directions. There are no rows.

PLANTING

The muck land is cleared and drained, the fields plowed, harrowed and marked off in rows about three and one-half feet apart, usually by a horse drawn marker making as many as four rows

at a time. In the spring the land is frequently so soft that the horses are shod with wooden shoes nine to ten inches in width, which are fastened to the hoofs or shoes by means of leather straps or metal bolts. An old established mint field supplies the plants for the new. In the spring the field is plowed, and men follow the furrow with pitchforks, hook out the roots from the upturned soil, shake off most of the soil that clings to them, and pile them in small heaps which are covered with soil to prevent their drying out. If the soil is firm, the roots may be dug with a potato digger. When the new field is prepared for planting, these plants are taken to it. A workman stuffs the roots into a sack suspended from his shoulder. One by one he draws out the roots and strings them along in the furrow, usually covering and scraping soil over them as he moves forward. In many fields mechanical planters are used which reduce the cost and the time required for planting. This planting will produce good crops several years, if well cared for. Sometimes a planting may be profitable for twelve years, if it is not winter killed, but most fields at the end of five or six years are plowed, new plants set out or some rotating crop is planted.

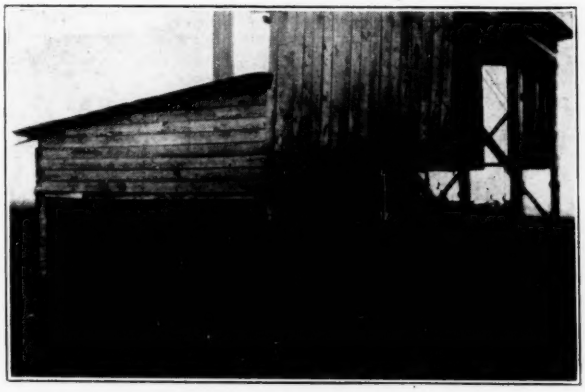

FIG. 3. A small still

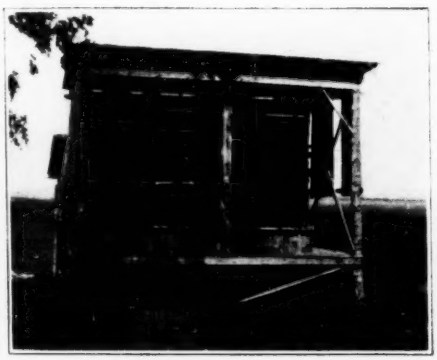

FIG. 4. "Tubs" or vats in a small still

CULTIVATING AND HARVESTING

After the field is planted it is dragged to level it off and to cover the roots thoroly. As soon as the mint appears above the ground it is cultivated by harrowing, or by weeders, and later cultivated as is corn. Since weeds in mint make inferior oil, it is very important that they be kept out. In order to do this satisfactorily hand weeders are necessary. In the large fields thirty or forty boys

may be seen working under a foreman. In the fall the mint fields that have produced a crop, and from which the farmer plans to gather a harvest the next year, are plowed under just before the ground freezes. As soon as the ground is in condition to work in the spring the field is fertilized and harrowed, these processes being followed by the horse-weeder before the mint begins to peep above the ground. After the first season the roots have spread from row to row, so there are no rows.

Fig. 5. A large still showing mint-"hay" being placed in the "tubs."

The peppermint harvest is a very busy season for the farmers. This begins when the mint is in blossom about the middle of July and lasts until the first of September. When hand labor is available one may see men with scythes cutting the mint and leaving it in swaths to cure; this renders it more easily handled and reduces the time for distilling. The curing process is of short duration, more so than for curing hay. As soon as the leaves have wilted, but not dry enough to fall off for they contain most of the oil, they are raked and bunched to make them more easily loaded. It is then loaded on hayracks and taken to the still.

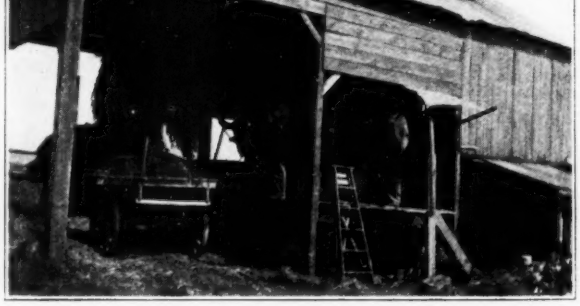

Fig. 6. Removing the steamed hay

Distilling

The peppermint still consists essentially of two or more wooden or galvanized iron vats, or "tubs" (usually six feet in diameter

and six or eight feet deep), fitted with heavy lids that may be clamped down to make the vat air tight, also a "worm" or condenser to condense the mint vapor which comes from the "tubs," and a separator to separate the mint oil from the water. These stills cost from $3,500 to $4,000 and most of them are individually owned as community owned stills have proved impractical.

FIG. 7. Draining off the oil

As one approaches the stills during the harvest season, he notices a strong odor of peppermint, and sees wagons loaded with mint arriving from the fields and smoke issuing from the chimney. The peppermint is packed in the "tubs" by means of a hay fork and crane, the "tubs" are then sealed and steam is forced thru them. The steam carries the vaporized oil along thru the condenser from which the oil and water pass into the separator. The water is drained off thru an outlet near the bottom of the separator, and is often carried by means of pipes to the boiler to be reconverted into steam. Thru another outlet near the top of the separator the oil is drained into 20-pound galvanized iron cans, or drums ready for market. The drums make for great ease and convenience in handling. Since the oil will keep for several years if tightly sealed and kept in a dark, cool place, the "drums" of oil may be held when prices are low, in times of over production, to be sold when more favorable prices can be secured. These drums have been deposited in bank vaults for safety against

FIG. 8. A 20-pound galvanized iron can or "drum" of oil ready for market.

theft. After the oil is extracted from the plants, the hay is drawn from the "tubs" by the use of a hayfork and crane, hauled to a grassy spot, and spread out to dry. It is then stacked, or put into barns to be used for feed for live stock, and is said to be as good as timothy hay.

The mint growers face the same great problems as other agriculturists, not that of production only, but the problems of the high cost of labor, the scarcity of workers and the greatest of all, the problem of marketing the oil. This last difficulty brought about the organization of the St. Joseph Valley Mint Growers' Association which seeks to stabilize the industry and to deal directly with the consumer.

WORCESTER MEETING OF THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS

The seventeenth annual meeting of the National Council of Geography Teachers will be held at Clark University, Worcester, Mass., December 26 and 27, 1930. The Association of American Geographers will hold their annual meeting the fore part of the week following. The Headquarters of the former organization will be the Bancroft Hotel. All the meetings will be held in the Geography Lecture Room at Clark University. Thru the courtesy of President W. W. Atwood, visiting members of our organization may secure lodging in the dormitories of the University at the low price of one dollar per person. The complete program follows in this issue of the JOURNAL. Every teacher of geography who can possibly do so should attend this meeting.

E. E. LACKEY, *Secretary*

PROGRAM

Friday, December 26, 1:30-4:30 P. M.

1. Greetings .....President Wallace W. Atwood
   Clark University, Worcester, Mass.
2. Response .....Secretary Earl E. Lackey
   National Council of Geography Teachers
3. The Need for and Nature of Home Geography in the Third Grade, Marion B. Forsythe
   State Normal School, Potsdam, N.Y.
4. The Need for and Nature of Journey Geography in the Fourth Grade, Isabelle K. Hart
   State Normal School, Oswego, N.Y.
5. Visual Education in Elementary School Geography .....Alfred W. Abrams
   State Department of Education, Albany, N.Y.

6. Village Life from Kenya to Finland .....Ellsworth Huntington
Yale University, New Haven, Conn.
7. The Need for the Nature of Field Work in Elementary School Geography .....
.....George S. Corfield
Clark University, Worcester, Mass.
8. The Measurement of Achievement in Elementary School Geography, E. Curt Walther
State Normal School, Towson, Md.
9. Next Steps in Geography in the Elementary School .....Edwin H. Reeder
Teachers College, Columbia University, New York, N.Y.

Friday, December 26, 7:30-10:00 P. M.

1. Geography as a College Entrance Subject .....Warren B. Cochran
Teachers College, Columbia University, New York, N.Y.
2. What Should We Do for the High School Pupil in the Commercial Geography Classes?
.....Lenox E. Chase
Mount Vernon High School, Mount Vernon, N.Y.
3. Curriculum Problems in High School Geography .....Alice Foster
University High School, School of Education, University of Chicago, Chicago, Ill.
4. Agricultural Conditions in the Union of Soviet Socialist Republics..W. Elmer Ekblaw
Clark University, Worcester, Mass.
5. Geography and International Commercial Relations .....J. Anton de Haas
Harvard University, Cambridge, Mass.
6. Geography in the Schools of Germany .....Frances Irene Murphy
Junior High School, Millburn, N.J.

Saturday, December 27, 9:00-12:00 A. M.

1. Lesson Planning—the Centralized Lesson .....Amy E. Ware
State Normal School, Salem, Mass.
2. An Experimental Introductory Course in Geography in the Normal School .....
.....Ivan C. Diehl
State Normal School, Frostburg, Md.
3. A Study of the Knowledge of Directions .....George F. Howe
State Normal School, New Britain, Conn.
4. Geography for Children .....Albert Perry Brigham
Colgate University, Hamilton, N.Y.
5. The Criteria for the Selection and Organization of Geographic Materials .....
.....Zoe A. Thralls
University of Pittsburgh, Pittsburgh, Pa.
6. Map Psychology .....Albert G. Eldridge
State Normal School, North Adams, Mass.
7. A Tentative Course of Study in Fundamentals of Geography for Three Year Normal Schools in New Jersey .....Ella Huntting
State Normal School, Jersey City, N.Y.

Saturday, December 27, 1:30-4:30 P. M.

1. Some Activities of the Committee on Educational Relations .....Erna Grassmuck
State Teachers College, Indiana, Pa.
2. Report of the Thirty-Fourth Annual Meeting of the American Academy of Political and Social Science .....Frank E. Williams
University of Pennsylvania, Philadelphia, Pa.
3. Geographic Aspects of the New Science of Soils .....L. A. Wolfanger
Columbia University, New York, N.Y.

4. The Need for and Nature of a Course in Meteorology and Climatology for the College or University. Charles F. Brooks, Clark University, Worcester, Mass.
5. The Need for and Nature of a Course in Physiography for the College or University. Armin K. Lobeck, Columbia University, New York, N.Y.
6. The Proposed Yearbook on Geography of the National Society for the Study of Education. A. E. Parkins, George Peabody College for Teachers, Nashville, Tenn.
7. Investigations in the Teaching of Geography. Edith Putnam Parker, University of Chicago, Chicago, Ill.

Saturday, December 27, 6:00-9:00 P. M.

1. Annual Dinner: University Dining Hall
2. Greetings from Past Presidents
3. Address: The English Lowland .....Dr. C. B. Fawcett
   University College, University of London, London, England
4. Meeting of the Board of Directors and Executive Committee

Reception at the home of President and Mrs. Atwood on Friday from 4:30 to 6:00 P.M.

Luncheon guests of President Atwood on Saturday at noon.

Journal of Geography Dinner by A. J. Nystrom and Co. on Friday evening.

INTEREST-STIMULATING DEVICE

A Geography Party

Perhaps some children might like to complete the following story by substituting the correct place name for each parenthetical expression.

Once upon a time, (1. capital of Maine) and her two brothers, (2. 3. capes on coast of Virginia), wanted to give a party. The fall of the year slipped by and so they decided to celebrate (4. a British island in the Pacific, near the equator) Eve. As that would bring the affair on a (5. very small island near Cape York which is in northern Australia) night, there would be plenty of time to get ready after (6. group of islands to which Java belongs).

They invited to their party the following girls—(7. a river in Siberia), and (8. 9. two of the South Atlantic States), also (10. a city in northern Italy), and (11. a city of Switzerland).

The boys decided to ask—(12. a Saint in Minnesota), and (13. a Saint in Missouri), and (14. a river in Russia), and (15. a city on the island of Tasmania).

At the party, for their first game, they were blindfolded and tried pinning a tail on a paper (16. city in western New York) which was tacked on the wall. Hobart won the prize and was given a toy (17. bay east of India) tiger. Louis won the next game and received a bright red (18. city in Morocco, Africa) which he wore the rest of the evening.

They have been wondering why Geneva had not come. When they were about to start a new game, she ran in (19. a group of British islands near the equator) herself vigorously, and said that she had been delayed by a (20. island north of Siberia not far from Bering Strait) caused by a lazy (21. British islands in the Pacific near 20 degrees south latitude). She had gone to (22. United States island about 20 degrees north latitude) a policeman before coming, but had not waited to see what he would do.

When the next game started, Virginia said, "If I just have good (23. city of northern India), I'll win a prize."

She won a little red toy wheel (24. Point on north coast of Alaska) to keep pins in; and Paul received a tin (25. Cape at southern end of South America).

Just when Mrs. (26. Island on which Brooklyn is located) appeared with a big box which seemed to have (27. city of Poland) of parcels, and the children were asked to stand about the table. Augusta, Charles and Henry, turn about, gave out the presents. Lena was given a string of beautiful (28. sea off northern Australia) beads; Georgia had a bottle of (29. city in west Germany) water; Florence, the youngest, received a doll with a pretty dress, an (30. Russian city on Caspian Sea) (31. mountain in Oregon) and a lovely blue (32. any small body of land extending into the water); Geneva was told that her present was behind her on a small table. She turned and saw a lovely little (33. sea between China and Chosen) (34. islands west of northern Africa). Virginia's present was a pendant of (35. African Coast east of Liberia) hung on a ribbon. The girls were so delighted with their gifts that they hardly noticed what the boys received.

Louis had a wooden (36. city in east China) rooster, almost a foot high; Paul received a wooden (37. group of islands including Unilaska); Don's gift was a (38. group of islands north of Scotland) pony image; and Hobart's was a (39. gulf south of France). Mrs. Long said that her children would get their gifts in the morning.

After a delicious dinner of (40. sea east of Ireland) potatoes and roast (41. country of Asia), ending with (42. old name for Molukka Islands west of New Guinea) cookies and ice cream, Mrs. Long passed little boxes of (43. city on island of Ceylon).

Don went to the door and found it was getting quite (44. volcano in Peru). He gave a (45. island in the Shetland group, north of Scotland) to the other boys who ran wildly to the door. Henry nearly knocked down his father who was coming in. Mr. Long said, "You boys seem to have (46. large islands southeast of Australia) pep tonight. My son, can't you be a little more careful?"

Henry replied, "I (47. tropic twenty-three and a half degrees north of the equator), please excuse me."

The guests now bade (48. cape at south end of Greenland) to the Longs and thanked them for a most delightful time.

KEY TO GEOGRAPHY PARTY

1. Augusta	13. Louis	25. Horn	37. Fox
2. Charles	14. Don	26. Long	38. Shetland
3. Henry	15. Hobart	27. Lodz	39. Lion
4. Christmas	16. Buffalo	28. Coral	40. Irish
5. Thursday	17. Bengal	29. Cologne	41. Turkey
6. Sunda	18. Fez	30. Astrakhan	42. Spice
7. Lena	19. Fanning	31. Hood	43. Kandy
8. Georgia	20. Wrangell	32. cape	44. Misti
9. Virginia	21. Cook	33. Yellow	45. Yell
10. Florence	22. Wake	34. Canary	46. New Zealand
11. Geneva	23. Lucknow	35. Ivory	47. Cancer
12. Paul	24. Barrow	36. Shanghai	48. Farewell

EMMA. G. STEVENS,
Colorado Springs, Colo.

Please send your devices to the Editor. We will be pleased to publish more plans that have been found to be helpful. This is the last one we have in our files.

GEOGRAPHICAL PUBLICATIONS

C. C. Huntington and Fred A. Carlson. *Environmental Basis of Social Geography*, 499 pages, 138 maps, diagrams, and photos. Prentice-Hall, Inc. New York, 1929. $4.00.

This book appears as another volume in that group of books from which geography teachers in colleges and normal schools may select their textbooks for beginning classes in geography. The scope of the book and the method of treatment are suited to the development of a sound knowledge of the fundamental facts of modern elementary college geography. The term "Social Geography" which appears in the title seems to have the same significance as the term "Human Geography."

The seventeen chapter headings indicate the general movement in the treatment of the subject. They are: Nature and Classification of Geography; Man's Distribution and Activities; Man's Environment; Location as a Geographic Factor; Maps and Their Interpretation; Major Climatic Regions of the Earth; The Seasons as Geographical Influence; Weather and Man; Lands and Their Utilization; The Utilization of Forest Land; Utilization of Lands for Agriculture; The Utilization of Urban Land; Minerals and Industries; Water and Its Utilization; Biological Environmental Elements; Social Factors in Environment; The Geography of Civilization.

In the first chapter is found a comprehensive treatment of the various phases of geography. The analysis given in outline form on pages 15 and 16, shows how modern geography, in its numerous specialized forms, aids in the interpretation of the various activities of man.

The treatment of man's activities and of man's environment is not limited to specific regions but has world significance and application, giving the beginning student a comprehensive view of the subject of geography. The geographic factors treated in the various chapters are developed from the world-wide point of view. The book thus introduces the student to the fundamental geographic factors and geographic principles which form a sound basis for later more specialized courses in Economic Geography, Regional Geography, Agricultural Geography, and other phases of the subject.

The maps, diagrams, and pictures are definitely related to the text and serve as an introduction to further map studies thru wall maps, atlases, and other sources. The chapter on "Maps and Their Interpretation" aids in the intelligent use of maps.

Altho designed as a textbook for colleges and normal schools, this volume will be of direct value to teachers of geography in the elementary school, junior high school, and senior high school as a reference book for themselves and for the stronger pupils. The larger treatment here offered of the ever-present geographic factors in man's environment and their influence on man's activities will illuminate the subject of geography for the teachers of the younger students.

The book merits careful study and evaluation by every teacher who is to select or to recommend college textbooks in geography or reference books for school libraries.

Clark University DOUGLAS C. RIDGLEY